said cell is etched in a silicon material and bonded between two layers of a Pyrex for interconnects; and

at least one of a plurality of highly reflective mirrors is deposited on said cell walls to increase the strength of a signal received from said photodiodes.

24. An apparatus according to claim **19**, wherein said light source is at least one of a laser, semiconductor laser and a vertical-cavity surface-emitting laser ("VCSEL").

25. An apparatus according to claim **19**, wherein said wave plate further comprises optics adapted to circularly polarize light from said light source, attenuate the light and change its spatial mode.

26. An apparatus according to claim **19**, wherein said apparatus is adapted in a gyroscope implementation that comprises an additional gas, wherein said gas is 129Xe.

27. A method of detecting magnetic fields comprising the steps of:

emitting light from a light source;

passing said light through at least one wave plate including optics adapted to circularly polarize light from said light source, attenuate the light and change its spatial mode;

passing said light through a cell containing an alkali species and at least one noble gas or equivalent;

generating an oscillating magnetic filed at a Larmor frequency of noble gas atoms in a direction perpendicular to said magnetic field with at least one of a plurality of coils;

generating an oscillating magnetic field at said Larmor frequency of the alkali atoms with a second set of said coils;

causing an atomic polarization to precess at a drive frequency about a magnetic field;

detecting a transverse component of said atomic polarization by monitoring an absorption of the edges of a diverging light beam using a plurality of photodetectors; and

determining the magnitude of the precessing transverse atomic polarization by subtracting signals coming from opposite sides of said light beam.

28. The method of claim **27** wherein said light source is at least one of a laser, semiconductor laser and a vertical-cavity surface-emitting laser ("VCSEL").

29. The method according to claim **28**, wherein said buffer gas comprises N2 or Ne.

30. The method of claim **27**, wherein said cell comprises at least one of a nuclear magnetic resonance ("NMR") cell and alkali vapor cell.

31. The method of claim **30**, wherein said alkali vapor cell comprises:

alkali atoms;

a buffer gas which prevents collisions of said alkali atoms with walls of said cell.

32. The method of claim **27**, wherein said cell comprises at least one of a plurality of angled walls to allow counter-propagation probe beams.

33. The method of claim **27**, wherein said cell is etched in a silicon material and bonded between two layers of a Pyrex for interconnects.

34. The method of claim **27**, wherein at least one of a plurality of highly reflective mirrors is deposited on said cell walls to increase the strength of a signal received from said photodiodes.

35. The method of claim **27**, wherein said coils comprises at least one of a three-axis coil and a radio-frequency ("RF") coil.

36. The method of claim **27**, wherein said coils are highly conductive traces.

37. The method of claim **27**, wherein said photodetector comprises photodiodes.

38. The method of claim **27**, wherein a heater is used to heat said cell and a thermal sensor is used to stabilize the temperature at a predetermined value.

39. The method of claim **27**, wherein at least one of said heater and said thermal sensor is implemented as traces on said base plate.

40. The method of claim **27**, wherein a spacer is used to align and attach said cell to said base plate.

41. An apparatus for sensing magnetic fields, wherein the apparatus comprises:

a cell adapted for containing alkali atoms at a their vapor pressure so that said alkali atoms can become polarized;

a light source adapted to generate a diverging beam of light arranged so that said diverging beam of light is passed through said cell wherein said light source is adapted to produce circularly polarize light; and

at least one photodetector adapted to measure magnetic field strength based on a reaction of part of said beam of light with said alkali atoms after said light field is passed through said cell.

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